THE NATURE CONSERVANCY NEWS

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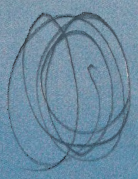

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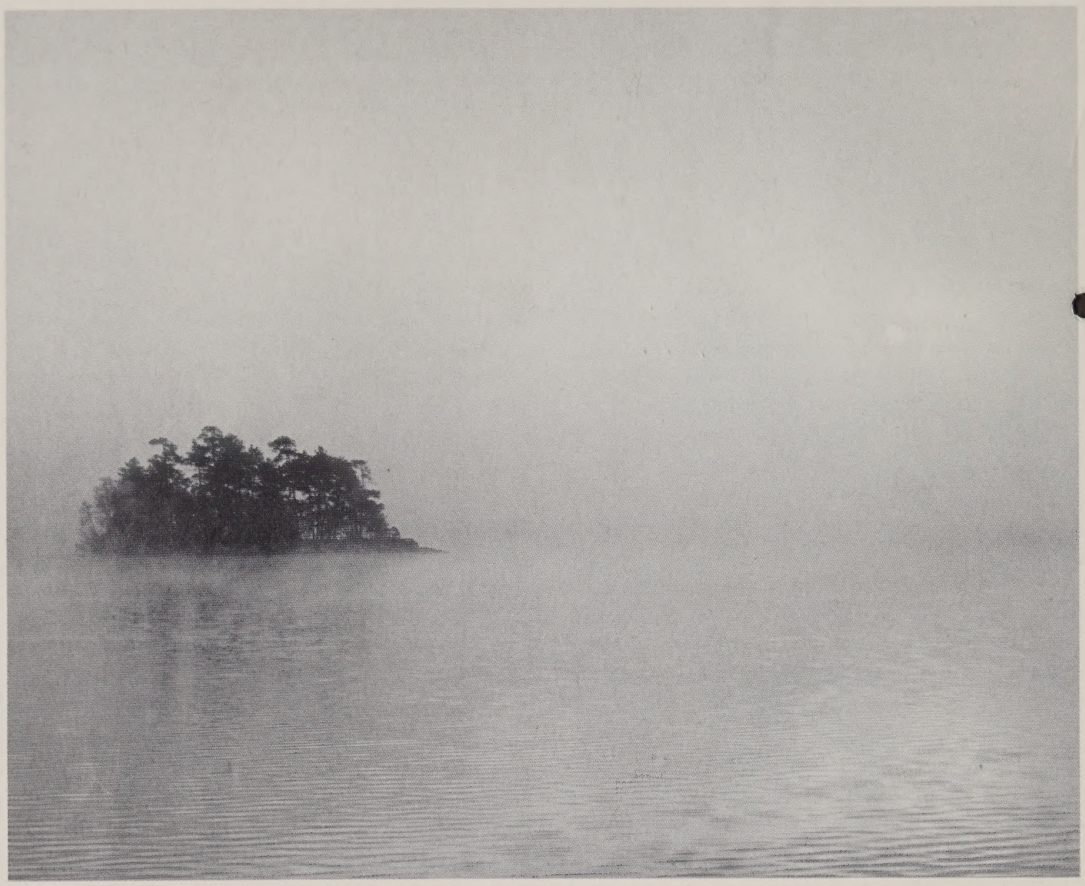
ISLANDS



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THE NATURE CONSERVANCY NEWS

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COVER: Paradise Island gull rookery and full moon, Lake Superior. Photo by Richard H. Smith, Earth Imagery.

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THE NATURE CONSERVANCY NEWS
is published bimonthly by The Nature Conservancy, 1800 North Kent Street, Arlington, Virginia 22209.

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The Nature Conservancy

The Nature Conservancy is a national conservation organization committed to the preservation of natural diversity by protecting lands containing the best examples of all components of our natural world.
To date the Conservancy and its members have been responsible for the preservation of 1,276,669 acres of forests, marshes, prairies, mountains, and islands: home to rare and endangered species of wildlife and plants. 1964 projects have been completed since the acquisition of the first preserve in 1954. Approximately 60% of all preserves are retained by the Conservancy and managed by volunteer land stewards.
A membership, non-profit organization, the Conservancy was incorporated in 1951 in the District of Columbia for scientific and educational purposes.

OUR FRAGILE EVOLUTIONARY HERITAGE:

Islands and Their Species

By Daniel Simberloff, Department of Biological Science, Florida State University

Islands have played an inordinately large role not only in the evolution and maintenance of the earth's biotic diversity but also in the development of our understanding of both evolution and ecology. Of the land surface of the earth, 5 percent is insular. If South America—which was an island up until about a quarter of a million years ago—is included, the figure rises to 19 percent. For a number of reasons, the world's flora and fauna would be far fewer were the earth not dotted with these isolated bits of land.

The Evolutionary and Ecological Significance of Islands

The fundamental feature of islands is isolation, which leads to both their biological importance and their interesting species and communities. From an evolutionary standpoint, isolation imposes genetic separation on populations that reach islands. This reduction in gene flow between organisms that extend to islands and their ancestral populations that remain on the mainland, or other islands, allows the evolution of unusual native forms. Of course it was precisely this island endemism that permitted Darwin, working on birds and reptiles in the Galapagos Archipelago, and Wallace, studying many animals in the Malay Archipelago, simultaneously to formulate the concept of organic evolution by natural selections from the wel-

ter of data and ideas then current in Victorian scientfic circles. The slight differences between populations on different islands were the key.

A century later these variations between island populations proved to be equally central to Mayr's unraveling of the mystery of how new species are formed from old: by the evolution of characteristics in isolated populations, which prevent their members from breeding with individuals in ancestral populations. Should the isolation then cease (as by the movement of continental plates or the capture of one river system by another) or should a few individuals from either species happen to invade the range of the other, two species would be present together where one had previously existed. This process—repeated, multiplied, and involving many locations and many species pairs —ultimately produced almost all the diversity present on earth and much of the plant diversity as well.

Because of their isolation, islands have played an enormous and increasing role in the development of the new science of ecology, begun about 1900. From an ecological standpoint, the isolation has two main effects. First, it allows ecologists to feel certain that an individual found on an island is actually part of the island community, and not simply a transient. By contrast, when one attempts ecological research in a mainland site, it is often very difficult even to delimit the resident community. This inability to establish boundaries hinders the study of such community phenomena as food pathways between populations. A second effect of isolation is that it causes island communities to be depauperate or poor in species. The relative simplicity of insular communities allows ecologists to study population interactions that would be obscured in larger, more complex mainland communities. A good example is the extended study of the Isle Royale community in Michigan, which showed that the addition of a predator trophic level (wolves) stabilized an interaction between plants and a large herbivore (moose) that formerly had produced characteristically drastic population fluctuations. (A trophic level is a feeding level in a food chain.) Such an inference would likely have been impossible in a mainland setting where the variety of foods and mortality factors would have confounded any observations. Similarly, the recognition that grazers (e.g., rabbits) on organisms which compete for space—such as plants or sessile (not free-moving) animals of the rocky coastal zone between low and high tide—can drastically affect species diversity first occurred on a small island, Ynys Seriol, off the coast of Wales. The spread of the viral disease myxomatosis through Ynys Seriol's rabbit population in 1955 drastically reduced the number of rabbits. Consequently, the number of plant species on the island increased from 61 to 102.

Population biological problems as well as community-oriented ones are often studied on islands. Mortality of the house mouse on Skokholm, a small island two miles off England's southwest coast, has been found to be primarily associated with severe winters rather than predation or competition. This inference was possible only because the insularity prevented migration of individuals from elsewhere from obliterating any inherent biological rhythms in the mouse population. Similar studies on rodents of islands in the Gulf of Maine, off Canada's western coast, in the seas around Britain, and along the coast of California have disentangled the relative contributions of biotic interactions vs. climatic catastrophes. Not only are the island populations all sufficiently isolated and small enough to be exhaustively censused, but different subsets of species on different islands allow the islands to serve as replicates of one another in natural experiments on changing species composition. For example, the house mouse on St. Kilda, in the Hebrides, was likely extinguished by competition from the field mouse, which is absent from Skokholm.

Island population studies may have economic as well as scientific significance. Islands are often used as testing grounds for biological control schemes because the fewer species and clearly delineated populations allow unambiguous observations. Release of irradiated sterile male screw-worm flies to control this southeastern cattle pest by preventing females from being fertilized was first tested on Florida's Sanibel Island, then on Curaçao in the West Indies. And potential detrimental effects of

"Since there are so few species, odd forms are able to survive that would have been eliminated by competition or predation from the many species in any mainland community."

a pesticide to control snails carrying the cattle-liver fluke were sought in a field test on Shapinsay, in the Orkney Islands.

The depauperation of island communities imposed by isolation has evolutionary as well as ecological consequences. Since there are so few species, odd forms are able to survive that would have been eliminated by competition or predation from the many species in any mainland community. The frequent flightless birds and insects found on islands exemplify this trend. About 25 flightless rails are known from remote islands in all oceans, as well as a like number of other birds. The dodos of the Indian Ocean islands are well known. On New Zealand and nearby islands there is even a flightless duck and a flightless wren. Less heralded but equally striking island inhabitants are flightless insects of all orders; the Hawaiian islands alone contain a flightless moth, fly, bug, as well as lacewings, wasps, crickets, and beetles. For insects it is often said that being flightless is positively adaptive since it prevents them from being blown out to sea, a greater danger on an island than on the mainland. On the other hand, for both insects and birds it is clear that the relatively small number of predators on islands makes it less important to have wings for rapid escape. Further, the frequent absence on islands of cats, rats, and other small predatory mammals means that the eggs of ground-nesting birds are not jeopardized.

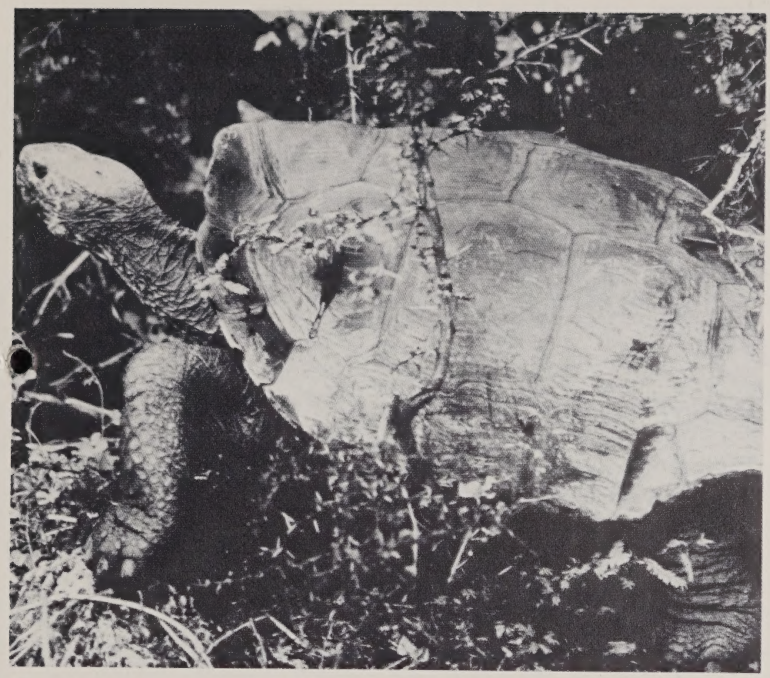
Impoverishment of island species is not random. Certain entire groups of animals, particularly mammals and amphibians, and plants, such as trees, are especially unlikely to reach distant islands because of limited overwater dispersal capabilities. Island biotas are termed "disharmonious" if proportions of certain taxa (species groups) differ greatly from those on the mainland. For example, the disharmony of remote oceanic islands is responsible for the frequency with which evolutionary gigantism crops up on islands. Enormous flightless birds, such as the recently extinct moa of New Zealand and elephant bird of Madagascar (over ten feet tall, and with two-gallon eggs!), replaced absent large mammals. Further, their survival was facilitated by the lack of small mammals that might have raided their nests. On the Galapagos Archipelago in the Pacific and Aldabra Island and Mauritius in the Indian Ocean, endemic giant tortoises take the role of missing large grazing mammals.

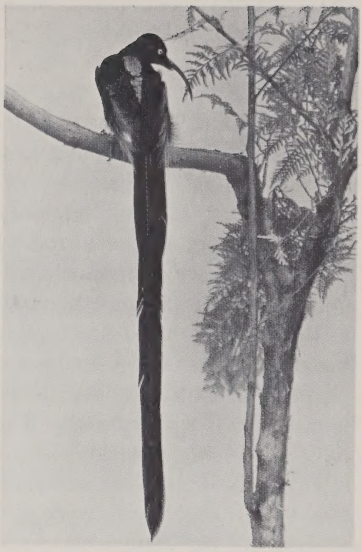
Island endemism is not limited to oddities like giants or flightless birds. An entire mammal biota has evolved on Australia from marsupials and substitutes for the placental mammals that dominate other continents. Australia's insularity protected the marsupials from the competitive extinction they suffered elsewhere at the hands of the placentals. The Australian marsupials are not bizarre; many of them look so much like placental mammals that close physical examination is required to tell them apart. But they *are* different, and are found nowhere else. Most island native species are not even so strikingly different as the Australian marsupials. For every spectacular island endemic species like the Galapagos tortoises, the New Guinea birds of paradise, and the Hawaiian honeycreepers—there are probably a hundred that would escape the notice of all but experts. However, they too are unique by virtue of their physical and, therefore, genetic isolation. These species are nonetheless important as components of the earth's evolutionary heritage, and we are impoverished with the extinction of any one of them.

Flightless cormorant, Galapagos Islands.

Different Kinds of Islands

Darwin and Wallace found that many of the biogeographic distributions they studied could





Two spectacular examples of island endemic species: the Galapagos giant tortoise and the New Guinea bird of paradise.

be rationalized by dividing islands into two different types, depending on their geological histories: oceanic and continental. Oceanic islands, such as Hawaii, Tahiti, the Galapagos, Tristan da Cunha, Ascension, the Seychelles, Reunion, and Madagascar arise from the deep ocean floor and have never (or at least for hundreds of millions of years) been connected to a continent. They are usually more distant, more depauperate, and contain more bizarre plants and animals than continental islands such as Japan, Taiwan, Ceylon, Zanzibar, Fernando Po, and Britain. These latter islands are on continental shelves and have all been part of a continental mainland whenever sea levels were lower.

Probably the most striking example of the geographic patterns accounted for by the distinction between oceanic and continental islands is described in Wallace's book, *The Malay Archipelago*. "Wallace's Line," passing through such narrow straits as those between Bali and Lombok or Borneo and the Celebes, defines the eastern limit of virtually all large mammals, as well as many birds and fishes. The remarkable difference between the populations of islands of the archipelago—in spite of apparently similar topography and climate—would be inexplicable if one did not realize, as Wallace deduced, that all the islands west of the line are in a shallow sea. These western islands were thus all connected to Asia when sea levels were lower during the Pleistocene, about 10,000 years ago. "Wallace's Line" actually consists of the westernmost underwater deep trenches. Although islands on both sides of the line are clearly visible, one from another, none of the islands east of the trenches were ever part of Asia. Similarly, another line has been drawn far to the east in the Malay Archipelago by Mayr, which delimits a number of Australian and New Guinean vertebrate groups. This line circumscribes those islands that are on the Australian continental shelf and were connected to Australia during the Pleistocene.

Recently ecologists have begun to focus on slightly different concerns from those of Wallace and Darwin. Instead of a primary interest in specific animals (Wallace was interested in elephants, for example), many ecologists are concerned with the sheer numbers of species, regardless of identities, found on different islands. The main generalization made in this field of study is the "species-area relationship"—that is, bigger islands have more species than smaller ones when all other obvious physical characteristics are the same. This is true most of the time, but disturbing irregularities exist. For example, most islands of 1,000 square miles lying in the vicinity of New Guinea have 60-75 landbird species, with most of this variation inversely correlated with their distance from New Guinea. However, Waigeu and Japen also are about 1,000 square miles in size but have 120-150 species. Diamond has shown that Waigeu and Japen, plus most other islands near New Guinea that appear to be "supersaturated" with bird species, are continental islands which were connected to New Guinea in the Pleistocene. Terborgh has ex-

plained similar anomalies in West Indian bird species diversity for the same reason.

The opposite of a recently separated (and therefore temporarily oversaturated) island is a volcanic island, either one re-recently formed or recently scoured of life by an eruption. Such islands are temporarily undersaturated or depauperate, and as they are colonized (or recolonized) by plants and animals, the pattern of biotic buildup is of great ecological interest. The most famous such volcanic island is certainly Krakatoa, on which almost all organisms were destroyed by the enormous eruption of 1883, heard 3,000 miles away. A number of less dramatic but equally important such events have occurred worldwide. Diamond has studied the recolonization by land birds of several volcanically cleared islands, seeking patterns in the order in which different species colonize and the way in which certain species respond to the temporarily impoverished condition. Totally new volcanic islands like Surtsey, which arose from the ocean near Iceland in 1963, also allow ecologists to study the colonization of new habitats and the processes of geological weathering.

Another recent development in ecology has been to view many habitats as insular that are neither continental nor oceanic islands. These "habitat islands" are characterized by being clearly delimited and different from the surrounding habitat, and more or less isolated from similar habitat. Patches of forest surrounded by fields, ponds, and lakes, and mountaintops are a few of the large entities whose communities have been termed insular. In addition, bromeliads with their enclosed fluids containing tiny organisms and animals, bracket fungi and their symbiotic insects, and even cow pats and the beetles and flies that colonize them have been viewed as micro-islands. Even more importantly, it has recently been suggested that parks and wildlife refuges act as islands for their organisms, since they are distant from other refuges and embedded in a "sea" of developed land. Perhaps the most convincing of all studies purporting to show island-like characteristics for patches of habitat is that by Vuilleumier on birds of the Andean paramo, a distinct kind of vegetation found only above a certain elevation. Patches of paramo are therefore separated by valleys from other patches. Vuilleumier has viewed the entire system as a kind of archipelago. About two-thirds of the birds found on paramo "islands" are restricted to this habitat and cannot migrate freely from one island to another. This results in a distributional pattern of birds on paramo islands very similar to that observed on oceanic archipelagoes. But for most such studies of habitat islands, the extent to which the habitat is truly insular is not nearly so well documented.

"The recognition that isolated habitats and wildlife refuges may function as islands increases the urgent need to study island biotic communities and the forces acting to change them."

Islands and Conservation

Conservationists are particularly concerned about the future of island animals and plants because island species seem to be especially prone to extinction. The recognition that isolated habitats and wildlife refuges may function as islands increases the urgent need to study island biotic communities and the forces acting to change them. Oceanic island communities are notoriously fragile. The effects of human ecological depredations over the past two or three centuries are nowhere as apparent as in the extinction of island endemic species. In archipelago after archipelago, land-clearing, rapacious hunting, the introduction of cats, dogs, rats, mongooses, goats, etc., and a host of other environmental insults have eliminated the dodo, elephant bird, Tasmanian wolf, great auk, and have ensured the extinction of even more island species that still exist. Perhaps the quintessential example is the Stephen Island wren, a flightless endemic bird on a small island near New Zealand. The island's entire population of the wrens was destroyed in 1894 by the lighthouse keeper's cat!

Island species seem unusually prone to extinction because of two contributing factors. First, island endemics have evolved in depauperate communities and therefore are not adapted to threats that mainland species are naturally selected to handle. Good examples are the many ground-nesting birds that evolve on islands without nest predators. Second, population decreases wrought by environmental change or human activity on islands cannot be readily compensated for by recruitment of individuals from populations in other locations. There are *no* replacements for endemic island populations. Much recent ecological research indicates that popula-

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tion processes for most mainland species are heavily influenced by immigration, which is absent on islands.

But island species are only *more* prone to extinction than mainland ones. Perhaps the main conclusion to be drawn from current research is that all species are doomed to extinction in probabilistic fashion. Consequently, the best that a science of conservation could conceivably do would be to state which ecological conditions minimize the rate of ultimately certain extinction. Simpson and others estimate that since the origin of life about a billion species have existed, of which at most ten million survive today. The average length of time that species persist is probably about 2.7 million years. Therefore, no matter what management procedures are adopted, species would likely go extinct at that rate.

Recent interest about the possible analogy of refuges to islands leads to a new scientific approach to conservation based on an ecological theory developed over the past fifteen years. This theory, the MacArthur-Wilson dynamic equilibrium theory of island biogeography, states that the number of species on an island is an equilibrium between extinction of species on the island and immigration of new species from the mainland or other islands. The theory sees extinction as a short-term, local, ecological phenomenon rather than a long-term, global, evolutionary one. The recognition that habitat "patches," like forests surrounded by fields, are "islands" suggests that the number of species in a refuge is a dynamic balance between extinction of those already present and the immigration of new ones. In the excitement with which conservationists have adopted this theory as a scientific basis for conservation, it has been forgotten that direct ecological support for the theory is sketchy and that ecologists themselves disagree about its validity. For example, all insect species were removed from an archipelago of small Florida Keys mangrove islands by fumigation, and the species' subsequent recolonization was monitored. For this archipelago of "experimental Krakatoas," the species number returned to that which originally existed, suggesting a true equilibrium. But most other studies have simply compared bird counts on a given island at different times, usually by different ornithologists. This research has been sharply criticized not only because of varying census quality, but also on the grounds that many of the "extinctions" recorded were not really population extinctions but just the manifestations of transient movement within bird populations, which range freely over islands and mainland. Data on the movement of individual birds are required to resolve this controversy, but such information is not available.

"The best that a science of conservation could conceivably do would be to state which ecological conditions minimize the rate of ultimately certain extinction."

The main lesson of island biogeography for conservation is said to be that refuges should be as large as possible, since large refuges will have larger populations and therefore lower extinction rates. Actually, a "species-area relationship" in which larger areas usually have more species was first observed in 1835. In addition to the dynamic equilibrium theory, there are at least two other explanations for the "species-area relationship." One is that large areas tend to have more habitats than small ones, each habitat contributing new species to the total. The other is that areas of land act as giant "nets," sweeping out larger or smaller fragments from some large community, more or less proportionally to the size of the area. These three explanations are neither exhaustive nor mutually exclusive. The habitat diversity effect is very well documented, while the "net" hypothesis has barely been studied.

As for the dynamic equilibrium theory explanation of the species-area effect, there is only one direct experiment, also on Florida Keys mangrove islands and their insects. In this test a decrease in area, with the number of habitats unchanged, caused a decrease in species diversity. Further, one could never predict *which* species would disappear when area was decreased; *all* species had increased probabilities of local extinction on smaller islands. It has been claimed that Barro Colorado Island, formed in 1914 during the construction of the Panama Canal, supports an island biogeographic equilibrium interpretation of the species-area effect. Approximately 170 bird species are now on the island as opposed to 210 when it was formed, but in addition to the area decrease (the island was originally part of a continuous mainland), the habitat has changed greatly. This may have caused local species extinction.

Whatever the reason for the species-area effect, it certainly demonstrates the need to include large amounts of land in refuges, even though it is recognized that species will inevitably and in-

exorably disappear from the areas. However, island biogeography theory does not tell us *what* specific area is required to preserve any particular species or number of species. Such rules can be discovered only by empirical work on individual species, and this work has just begun on English birds and Melanesian reptiles and birds.

A second widely put-forth suggestion is that for a given amount of area devoted to conservation, the optimal arrangement is a single contiguous refuge rather than a network of smaller ones. The equilibrium theory of island biogeography is neutral on the spatial arrangement and partitioning of a particular amount of land. This question is clearly an empirical one. Only one direct test has been performed, on five small red mangrove islands turned into archipelagoes of even smaller islands. The results were ambiguous, with some archipelagoes containing more species of resident insects than the original single islands and others fewer. Two sets of non-experimental data—one on crustaceans of coral heads and the other on birds in New Jersey forests—have also been brought to bear on this problem, again with uncertain results as to whether one large or several small habitat islands contain more species. It appears that no generalization is imminent about this aspect of refuge design. More intensive study of individual taxa will be required.

A network of refuges would, however, constitute a bet-hedging strategy against catastrophes such as fire or epidemic diseases. Such disasters might be restricted to single refuges in a network. Subsequently, a devastated refuge might then be recolonized from the others. For example, the Seychelles Islands in the Indian Ocean contained 14 endemic land bird species before the arrival of Europeans in 1770. In the two centuries since then, land-clearing, a series of fires, and introductions of predators such as rats and cats have greatly degraded this archipelago. However, only the green parakeet and another bird, the chestnut-flanked white-eye, have been extinguished. This restricted loss is partly due to there being several small islands and not just a single large one, for fires and introduced predators were unable to reach all the islands. The Seychelles magpie robin, for example, remains only on Frigate Island; feral cats have destroyed it elsewhere but were controlled on Frigate and cannot reinvade because of the water barrier.

Ecologists have also suggested that island biogeography dictates that a given sized refuge should be round in shape, not long and thin. This is related to the "peninsula effect" of classical biogeography, which says that many peninsulas have a decrease in species diversity occurring from their origin down to their tip. Island biogeography theory explains this as a consequence of decreased immigration rate at the tip imposed by its great distance from the origin, so that local extinctions at the tip are not readily compensated for by recolonization. But no experiments show that round refuges preserve more species. Furthermore, two recent studies of classical peninsula effects on large peninsulas, such as Florida, suggest that the species diversity gradient is caused by differences in vegetation structure from one end of the peninsula to the other, and not by the peninsula *per se*.

So except for the strong evidence that we should preserve as much area as possible, the concepts of island biogeography theory discussed in this article have no new insights or rules to offer conservation planners. Island biogeography is not usually directed at species of interest, which must be studied individually, and even its suggestions on what maximizes number of species have not been thoroughly tested. On the other hand, as more and more research is done on individual species and specific communities, ecologists are gradually approaching an understanding of the causes of species population explosions and crashes, the nature of the subtle and delicate interactions among species and between species and their physical environment, and the determinants of community stability. As such knowledge accrues, it enables ecologists to say with increasing assurance what steps are required to preserve species and communities, even the odd species and peculiarly fragile communities of oceanic islands. The problem is not a lack of ecological expertise, but rather one of willingness to make economic and political sacrifices to facilitate the continued existence of the non-human inhabitants of our planet.

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First Fund-raising Deadline Met in Campaign to Save Santa Cruz Island

Just as this issue of *The Nature Conservancy News* went to press, the Conservancy met the deadline to begin acquiring Santa Cruz Island—the largest and biologically richest of the Channel Islands lying 23 miles off the coast from Santa Barbara, California. In meeting the deadline, the Conservancy was able to exercise its option to acquire control of 90 percent, or 87-square miles, of the island.

The Atlantic Richfield Foundation launched the fund-raising effort to save Santa Cruz Island with a $75,000 contribution in September, 1977, which it followed with a $1 million pledge last April. Since the campaign was started, individuals and organizations, such as the Ahmanson Foundation, Chevron U.S.A., and the James Irvine Foundation, have made major donations to preserve the island. In addition, a unique "Save-An-Acre Campaign," created by Barbara Horton, trustee of the Southern California Chapter, has stimulated over 1,500 individuals to contribute more than $175,000 in small gifts.

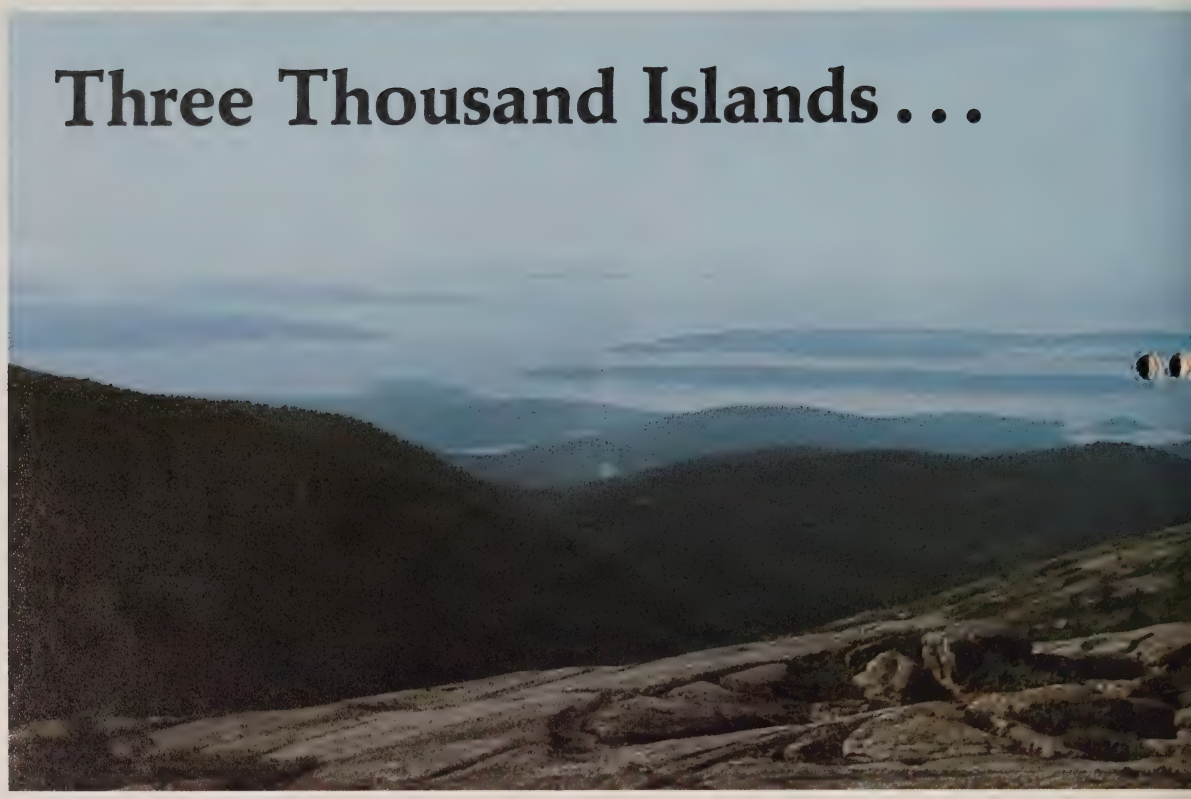
The goal set for the first fund-raising deadline was $3 million. Although only $2.6 million of the amount was raised, the Conservancy received such extraordinary support in its efforts to preserve Santa Cruz that it was able to proceed with the acquisition. The Conservancy now must raise, in six months time, another $1.4 million to complete its campaign and to insure preservation of the island. Without this additional amount, the Conservancy cannot adequately protect Santa Cruz, which it will retain and administer, or implement any of its exciting public use and management programs.

Small scale environmental education programs for Santa Cruz Island are already being developed, to be offered first to local schools and then expanded to include other educational institutions and organizations. The island's nearness to the large metropolitan area of Los Angeles, which is about 50 miles away, provides an excellent opportunity for city-dwelling children to experience nature. Plans are being made for small groups to visit the island this fall.

Management plans for Santa Cruz include removing the remaining feral sheep, so as to preserve the unique array of endemic plants and trees; protecting the archaeological sites, which number around 3,000; and constructing a dwelling for the preserve manager and a reception center for island visitors. An island museum is being considered for the future.

The Conservancy has only just begun to save this remarkable and magnificent island—home for nine rare endemic plants, an endangered fox, seals and sea lions, uncommon elephant seals, and a variety of bird life. Please send your donations to complete the preservation of Santa Cruz Island to: The Santa Cruz Island Fund, The Nature Conservancy, Western Regional Office, 425 Bush Street, 5th Floor, San Francisco, California 94108.

Three Thousand Islands . . .



By Mary Minor C.S. Lannon
Stewardship Director, Maine Chapter

The coast of Maine immediately brings to mind thoughts of deserted spruce-covered islands, lobsters, and sailboats gliding about on sun-sparkling waters. But what really *is* this coast and what is its future? Is it as undisturbed as we would like to think? Will it remain that way?

There is definitely a mystique about the Maine coast, with its 3,000 or more islands—the largest concentration of islands in the continental United States. Many, of course, are small, but they add to the scenic beauty of the coast and, more important, provide habitat for its wildlife. Seals find the rock ledges where they bask in the sun just as vital as the local resident may find his 50-acre island. However, demands are increasing on Maine's coastal resources, pressures which could drastically alter the character of the shoreline and its islands.

Early in its history, the Maine Chapter of The Nature Conservancy recognized the value of the coast and turned its attention there. When the Chapter was formed in 1956, the second home building boom was beginning to make itself felt and many prime shoreline areas were already being developed. The Chapter's direction also was influenced by its honorary chairman, Rachel Carson, whose research for *The Edge of the Sea* and *The Sea Around Us* was done partly on the Maine coast. (Later the Chapter was to acquire as a gift one of Miss Carson's research sites, the Rachel Carson Salt Pond in Bristol). The Chapter has steadily pursued the protection of Maine's coastal habitats, and today some 38 preserves, both islands and coastal mainland sites, comprise a system known as the Rachel Carson Seacoast of The Nature Conservancy.

Islands are the unique component of the system. Although the Conservancy owns but a small percentage of the total islands on the Maine coast, it is the largest private island owner, holding title to all or part of 23 islands. In addition, 13 other islands are protected by conservation easements. Given the organization's holdings and the Chapter's continued efforts to protect additional islands, the Conservancy has a vital role to play in the future of the Maine coast.

Ecologically the islands are fragile. The soils are thin and support fewer species of plants than are found on comparable mainland areas. Fresh water is often non-existent. As in high mountain regions, lichens and mosses are common, as are plants that are vulnerable to heavy use by man. Yet, the vegetation is hardy enough to withstand continual batterings by wind and tide.

One of the most important functions of the is-

Their Future?

lands is their role in providing undisturbed habitat for seabirds and seals. In fact, the Maine coast has some of the most important nesting sites in the continental U.S. for a large variety of colonial seabirds.[1] The Conservancy's islands include nesting areas for heron, cormorant, osprey, guillemot, and black-backed and herring gulls. Last spring a pair of bald eagles—one of the 44 nesting pairs in the state—returned to nest on Flint Island off Harrington. Indeed, the islands and shoreline areas provide most of the state's nesting habitats for these endangered birds.

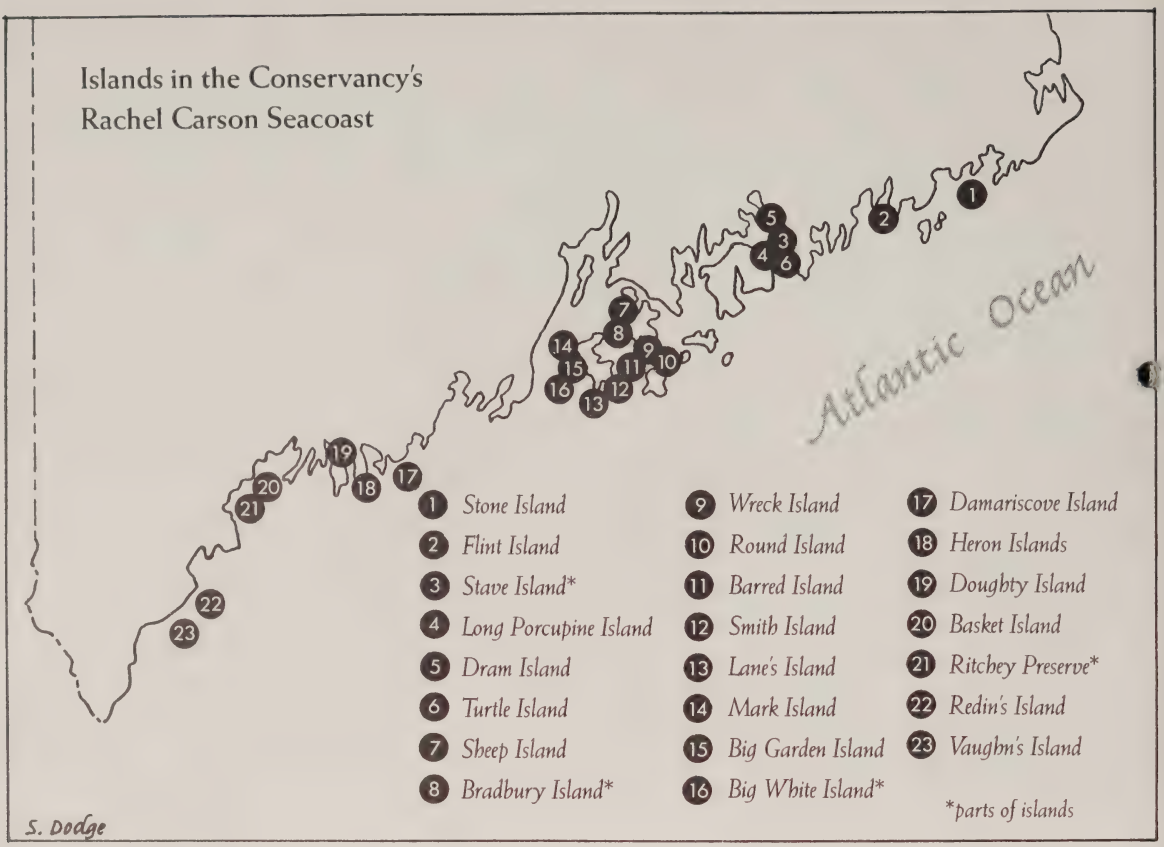
Other wildlife on the islands is much more limited. There is a rich marine population, but terrestrial animals are few. Field mice and other small mammals are found on most. White-tailed deer inhabit the larger islands such as Bradbury. Restricted by their size and resources, the Conservancy's islands offer ideal locations for studying these species. This summer, student interns will investigate the environment of an unusually large population of muskrats on Damariscove Island, and a college professor will continue his research on field mice on Wreck Island.

High on the scale of wildlife significance is the potential acquisition by the Conservancy of the southern portion of Great Wass Island off Jonesport. Located way downeast in Washington County, the island parcel of approximately 1,500 acres contains undeveloped forest lands, huge bog areas, and over 50,000 feet of rugged shoreline, all providing habitat for unusual vegetation and animal life. Several rare vascular plants have already been identified on the island. One intertidal area is one of 18 areas along the entire Maine coast to be recommended for registration by the Critical Areas Program because of its high species diversity and because it includes species not found intertidally anywhere else in the U.S. Great Wass is part of the region identified by the Fish and Wildlife Service as having the third largest black duck population in the country. The island's ledges are recognized as significant seal haulout areas so necessary for their foraging and safety. The island's future protection rests with the Conservancy's ability to raise $1.2 million before November 1, 1978.

It is important to keep in mind that from earliest times the Maine islands have been occupied and used. Although today only about ten percent of the islands are inhabited, the islands are deeply integrated into the lives of the people who live on the coast. Nonetheless, they have generally maintained an undisturbed character, or at least have not yet been defiled by the trappings of modern society.

Human use has changed the character of the islands certainly, and there is much evidence to remind us of their past. Today's visitor to the Conservancy's Wreck Island in Penobscot Bay can still see the wagon ruts and cellar holes of the homes of 19th century settlers. The island has grown back around the holes and ruts, however; they are not scars on the land. Shell heaps on many of the islands, including several Conservancy preserves, indicate that Indians were the first to visit the islands. They were followed by the early settlers who used the islands as seasonal fishing bases. Settlements have been reported on Damariscove Island as early as 1601,[2] and history records that supplies were sent from Damariscove to keep the Plymouth Colony alive. Although faster boats make it more expedient to operate from the mainland, the islands still play a role in the fishing industry. Three fishermen continue to be based on Damariscove Island during the summer. By special arrangement, they also act as caretakers for this Conservancy preserve.

More concentrated use came first to the Penobscot Bay area. Settlers were drawn by the abundance of islands, recognizing them as excellent pre-fenced pastures. (The reason for so many Sheep, Hog, and Cow Islands dotting the coast becomes clear!) The livestock, of course, kept the vegetation from growing back up in thick spruce,



but the long-term effect on the islands does not appear to have been devastating. Wreck Island had sheep grazing on it until a few years ago, which kept it quite open, providing a sharp contrast to thickly wooded Round Island adjacent to it. Sheep will be returned to part of the island in the future, allowing a chance for more detailed study of the effects of sheep on the island's ecology.

The islands were also good sources of lumber, first for kilnwood for the lime quarries and later for pulp to feed the mills. Turtle Island in Frenchman's Bay had been partially lumbered when local citizens rallied to ensure that the rest of the island would not succumb to the chain saw. Today this island preserve protects spruce identified by the natural resource inventory to be about 100 years old. Although many of the islands were cut over, the expense of removing the wood has allowed second growth and, in some cases, third growth trees to come back, giving the coast its heavily wooded appearance.

Perhaps the greatest early pressure on the islands was caused by demands for granite from quarries, primarily located in Penobscot Bay. Populations in the area grew to heights never before obtained. For example, the population of Hurricane Island, now operated as an Outward Bound School, grew from a few settlers to 1,200.[3] In all, some 33 major quarries were operated along the coast. Today quarrying has all but died as an industry, and so far has not been replaced by other heavy industry. Several oil refineries have been proposed, but as yet have not been successful. Stone Island, once proposed as supertanker offloading site, is now owned by the Conservancy. The isolated isle, recognized by Maine's Critical Areas Program, hosts a heron rookery with more than 80 nests.

Today the islands are used mainly for recreation, mostly by day visitors stopping for a picnic or a swim. But more and more people are spending their leisure hours boating and are drawn increasingly to the Maine Islands. This is perhaps the greatest pressure currently on the islands. As many as 100 boats have been counted in the harbor of Damariscove Island on a bright summer day.

Under Maine law, inherited from colonial days, one is permitted to land on islands that are privately owned. This common right extends to the high-tide mark, but it is often difficult to contain the enthusiasm of visitors. Over half of Maine's islands remain in private ownership. As more owners become disgruntled with people and their litter, recreational demands increase on other islands that are open to the public, such as state-owned islands and those held by private conserva-

The Maine islands are breeding sites for a variety of seabirds, including cormorants and herring gulls.

tion groups like the Conservancy.

Organized educational or recreational use of the islands has also intensified. A recent Parks and Recreation Study showed that 33 different groups currently use the Maine Islands. The groups are drawn primarily by the islands' wild quality; but will the increase in groups ultimately aid in the destruction of this value?

The islands of the Conservancy's Rachel Carson Seacoast have also been used by environmental and outdoor education groups. For example, through an annual agreement, the Hurricane Island Outward Bound School conducts its solo expeditions on several of the islands. For several years the Cooperative Extension Service and 4-H have offered outdoor educational programs on Vaughn's Island off Kennebunkport. Area children camp on the island for three days and are taught marine ecology, local history, and no-trace camping. Through an annual agreement, the Hurricane Island Outward Bound School conducts its solo expeditions on several of the islands. By monitoring this use, the Maine Chapter tries to ensure that such activity is not detrimental. Consequently, some islands used one year may not be included in a program the next.

Interest in the future of Maine's islands and their resources has increased greatly since the late 19th century when an island could be bought for as little as 25 cents.[4] In 1913 the state determined that no more state-owned islands should be sold. It was not until 1973, however, that the Coastal Island Registry was established, requiring island owners to register their holdings. Those islands not registered would become the property of the state. Though the sorting out of titles still continues, some 1,299 islands have been determined as belonging to the State of Maine (over and above islands already owned by state agencies such as the Department of Inland Fisheries and Wildlife, and the Bureau of Parks and Recreation). A management plan has been drafted for these properties, including a proposal to lease to the Conservancy some of the islands adjacent to existing Conservancy preserves.

The Nature Conservancy has played and can continue to play an important role in maintaining the undisturbed character of Maine's coastal islands. As preserved natural areas, the islands and shoreline sites of the Rachel Carson Seacoast offer the certainty that some of the irreplaceable parts of the coast will remain undeveloped. Realistically, the Conservancy can own only a small percentage of the island resource, but perhaps more important, it can strongly encourage and work with island owners in continuing to protect their island resources into the future. In some cases this may involve acquisition or conservation easements, but for the most part, the island owners have been careful stewards of their land for decades, and the success of the future will be a careful blend of public and private ownership which foremost recognizes the values of Maine's irreplaceable coast.

[1] Philip W. Conkling and Barry S. Timson, *A Management Plan for the Unregistered Coastal Islands of Maine.* (Draft report prepared for the Bureau of Public Lands, Department of Conservation, State of Maine, April 1978), p. 45.

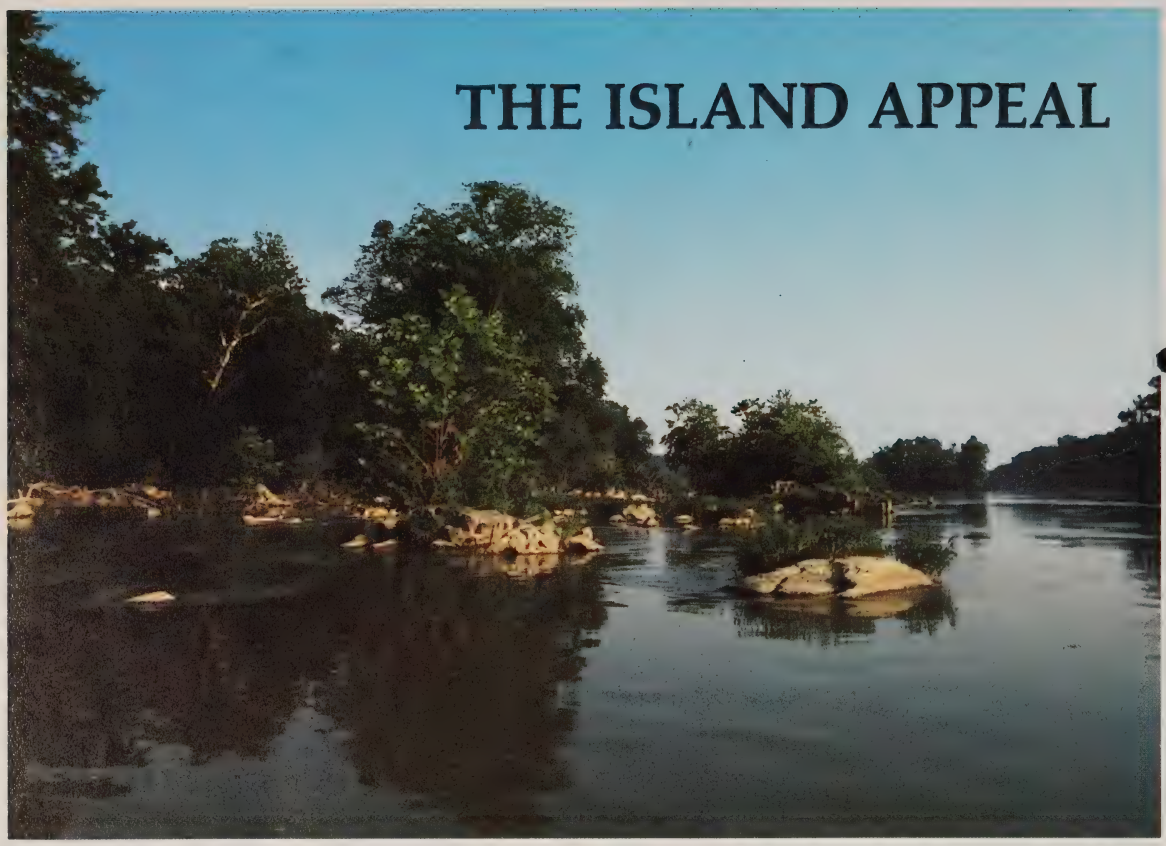
[2] Hugh MacArthur and James A. St. Pierre, *Maine's Coastal Islands.* (Draft report prepared for Bureau of Parks and Recreation, Department of Conservation, State of Maine, March 1978), p. 27.

[3] Conkling and Timson, p. 4.

[4] MacArthur and St. Pierre, p. 33.

Note: Much of the background on Maine islands was drawn from the research contained in the above two reports.

THE ISLAND APPEAL



Potomac River Islands

Inland Islands Preserved Through the Efforts of the Conservancy

Burntside Lake

Green heron

The 1978 Annual Meeting and Field Trips
Washington, D. C.
September 14-18, 1978

Official Notice

Notice is hereby given to the members of The Nature Conservancy, pursuant to Article VII, Section 2 of the Bylaws of The Nature Conservancy, 1976 Revision, that a membership meeting will be held at the Arlington Hyatt House, Arlington, Virginia, at 10:15 a.m. on September 15, 1978, for the purpose of receiving reports, electing Officers and Governors of The Nature Conservancy for the ensuing year, and acting on such other business that may come before the meeting.

Please note the enclosed official ballot. It should be signed and returned as described therein.

Patrick F. Noonan, President

1978 Annual Meeting
Arlington Hyatt House, Arlington, Virginia

Schedule of Events

Thursday, September 14

1:30-7:00 p.m.
Registration, Arlington Hyatt House

2:00-4:30 p.m.
Business meetings of the Audit, Finance, Development and Planning Committees of the Board of Governors.

6:30 p.m.
Buses leave from the Hyatt for the

7:00-9:00 p.m.
Opening Reception — Cocktail Buffet at "Hillandale," gracious home of John D. Archbold, member of the Board of Governors.

Friday, September 15

8:30-10:00 a.m.
Science/Land Stewardship Committee Workshop; Dr. Richard H. Goodwin, Committee Chairman

10:15-11:15 a.m.
Annual Membership Meeting, John E. Andrus, III, Chairman of the Board, presiding.

Election of Officers and Members of the Board

President's Report to Members; Patrick F. Noonan illustrates with slides of Conservancy activities across the nation.

11:30-1:00 p.m.
Volunteer Activities Committee Workshop; G. William DeSousa, Committee Chairman

Governmental Relations Committee Workshop; Honorable Francis Sargent, Committee Chairman

1:00-2:00 p.m.
Buffet Lunch

2:00-3:30 p.m.
Project Review Committee Workshop; Frank D. Boren, Committee Chairman

6:15-7:15 p.m.
Open House at the Conservancy's National Office, a short, two-block walk from the Hyatt House.

7:30 p.m.
Annual Awards Banquet, Arlington Hyatt House

Remarks by Secretary of the Interior Cecil D. Andrus

Presentation of Oak Leaf Awards, Outstanding Chapter Award, and President's Stewardship Award

Saturday, September 16

6:45 a.m.
Buffet breakfast for all those registered for field trips

7:45 a.m.
Buses will leave *promptly* for field trips

For those attending the field trips, more information concerning schedule, necessary clothing, etc., will be sent at a later date.

Official Ballot

Name (please print) _____

Address _____

_____

Signed _____

A valid ballot can be executed only by a member in good standing. To cast your vote for slate of officers and governors proposed by the Nominating Committee, return signed ballot to The Nature Conservancy. To allow sufficient time for processing, ballots should be received by September 8, 1978.

Proposed by the Nominating Committee for Election to the Board of Governors

Nominated as Officers

John E. Andrus, III, Minnesota, renominated as chairman. Former President, Deep Draw Corporation; trustee, Minneapolis Society of Fine Arts; trustee, Conservancy's Minnesota Chapter; trustee, Mar-Brook Foundation; Advisory Committee for Bell Museum, University of Minnesota; Member of the Board, Metropolitan Park Foundation.

Honorable Thomas L. McCall, Oregon, renominated as vice chairman. Former Governor of Oregon; presently professor, Oregon State University; member of the President's Citizens Advisory Commission on Environmental Quality.

Honorable Nathaniel P. Reed, Florida, renominated as vice chairman. Former Assistant Secretary of the Interior for Fish, Wildlife and Parks; amateur botanist, ichthyologist and biologist; past chairman, Florida Department of Air and Water Pollution Control; advisor on environmental matters for three Florida governors; former honorary chairman of the American Land Trust.

Mason Walsh, Jr., Pennsylvania, current member nominated as vice chairman. Vice President and General Counsel, Richard K. Mellon & Sons. Trustee of several charitable trusts and foundations; trustee, Western Pennsylvania Conservancy. Active conservationist.

Charles C. Haffner III, Illinois, renominated as treasurer. Former chairman and current treasurer of the Illinois Chapter of the Conservancy. Vice President and Treasurer, R.R. Donnelley & Sons Company; trustee of Morton Arboretum.

Robert B. Anderson, New Mexico, renominated as secretary. President of Lincoln Land and Cattle Company. Graduate of Cornell in animal sciences. Former member of the Peace Corps and technical advisor to the government of Columbia. Active in New Mexico conservation and historic preservation.

Nominated as Members of the Board

Dr. F. E. Balderston, California, Professor of Business Administration and Chairman, Center for Research in Management Science, University of California at Berkeley. Author of several management publications.*

Walter J. Bogan, Jr., Washington, D.C., Director, Office of Environmental Education, Department of Health, Education and Welfare; former executive director, Scientists' Institute for Public Information; former trustee, National Audubon Society; author of several publications on environmental education.

Frank D. Boren, California, Attorney; former chairman and current trustee of the Conservancy's Southern California Chapter; member, Sierra Club; partner of law firm Paul, Hastings, Janofsky. Current vice chairman.*

Noel Lee "Skip" Dunn, North Carolina, partner, Pilot Insurance Agency; Senior Vice President, Ducks Unlimited, Inc.; Chairman, Board of Trustees, Izaak Walton League of America; Vice President, North Carolina School of the Arts Foundation; active conservationist.

R. Philip Hanes, Jr., North Carolina, Chairman of the Board, Hanes Dye & Finishing Co.; Board of Trustees, National Audubon Society, Izaak Walton League of America, Southern Appalachian Highlands Conservancy; member, Young President's Organization and recipient of North Carolina Governor's Award for Preservation of Natural Areas. Active conservationist.*

John A. Hillenbrand II, Indiana, Vice President and member of the Board of Directors, Hillenbrand Industries; Chairman, Indiana Natural Resources Commission; Chairman, Governor's Water Resources Study Commission; former member, Indiana Committee for the Humanities; active in several local conservation groups.

Dan W. Lufkin, New York, former Commissioner of the Connecticut Department of Environmental Protection; co-founder of Donaldson, Lufkin & Jenrette; Trustee, Environmental Defense Fund; Chairman, National Park Foundation; author and active conservationist.*

Mrs. Walter H. Page, New York, Chairman of the Conservancy's Long Island Chapter; Board member of Robert College, Pierpont Morgan Library, Action for the Preservation and Conservation of the North Shore of Long Island, Heckscher Art Museum; active in conservation and education.

A. Timon Primm III, Missouri, newspaper executive; Vice President and General Manager of the Pulitzer Publishing Company; trustee of the Missouri Botanical Garden and Conservancy's Missouri Chapter.*

G. Jon Roush, Montana, rancher, former executive vice president of the Conservancy; member of the Rockefeller Brothers Environmental Task Force; former member of the Board of Directors, Northern Rockies Action Group; member of the Board, Montana Land Reliance; author of several publications in the fields of conservation, art and literature.

*Current Member Renominated

I am interested in attending the 1978 Annual Meeting of The Nature Conservancy in Arlington, Virginia. Please send the necessary registration materials immediately.

Name _____

Address _____

_____

Telephone _____

Please return this portion to ANNUAL MEETING COORDINATOR
The Nature Conservancy
1800 North Kent Street
Arlington, Virginia 22209

By Anne M. Byers
Staff Writer

Gentle breezes, warm sands, the lulling sound of lapping waves . . . isolation and solitude. From the time that humans began exploring the earth, islands have possessed an innate appeal and fascination to probably everyone. On a peaceful isle, you have a sense of apartness, of being in a self-contained, separate world where the mundane realities and monotonous routines of everyday life are left behind, replaced by a feeling of unity with your surroundings. This is the magic of islands—the blissful free experience of escaping from mainland worries and tensions. The insularity of an island emphasizes the more important realities of nature's world—the sound of an eagle's call overhead, the good musty smell of the earth after a sudden rain, the quick glimpse of a shy river otter as it dives beneath the water.

While most of us may fantasize about fleeing to a sun-drenched South Pacific island covered with coconut palms, the inland islands of our country's rivers and lakes are far more accessible and offer just as much escape-appeal. The often-flooded mud and sand islands of the Mississippi River were just as adventure-filled and irresistible to Huck Finn as that far-off tropical isle was to Robinson Crusoe. As a matter of fact, the greatest concentration of this country's river islands lies in the upper reaches of the Great Mississippi.

River Islands

A group of five Mississippi River Islands, lying in a stretch of Old Man River in Minnesota that has been designated a state canoe route, were donated to the Conservancy in 1976 by the Northern State Power Company. The islands contain fine examples of Mississippi floodplain flora with dominant canopy trees such as American elm, slippery elm, black and green ash, eastern cottonwood, silver maple, and box elder. The largest of the islands — 40 acres — contains bladdernut, which forms large thickets and represents the northernmost extension of this plant species' range. Most of the islands are low, flat, and sandy; and typical of many river isles, they are flooded annually. The 182-acre island complex is managed by the Minnesota Department of Natural Resources.

Farther down the Mississippi River in Illinois lies the Conservancy's Cedar Glen Eagle Roost, the largest wintering habitat on the river for endangered bald eagles. The rare birds flock to the heavily forested and rolling glen every December and stay until early March. As many as 133 eagles have been sighted in a single season.

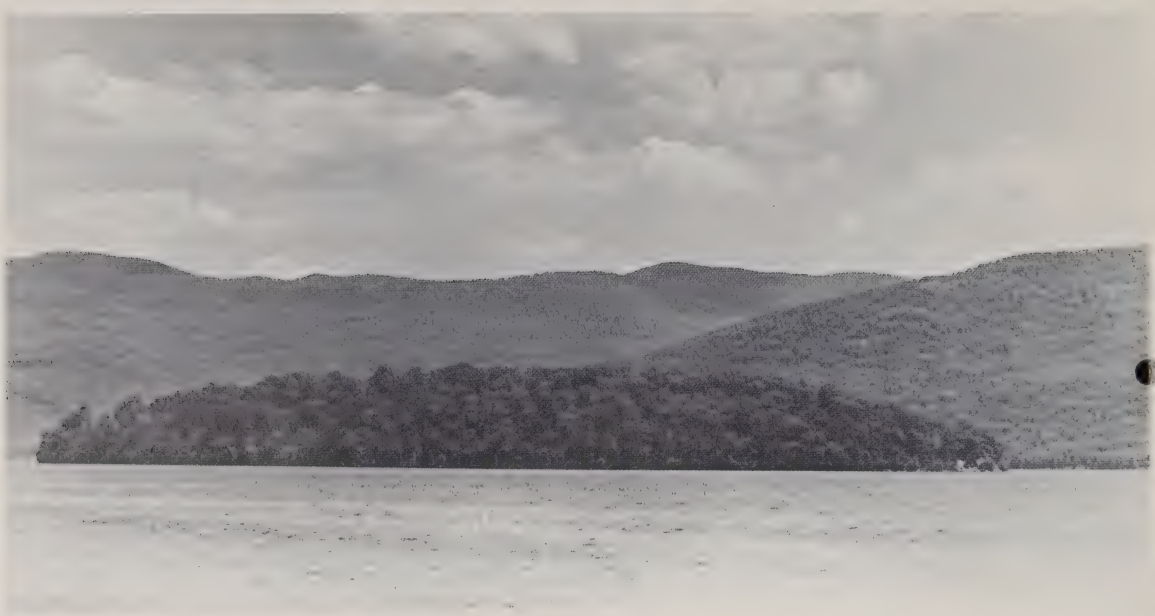
The four Mississippi River islands included in the Cedar Glen preserve play major roles in providing suitable habitats for the eagles. Mud and Oliver's Islands represent the largest and most critical areas available for the eagles to roost during the day. From their sunny perches in the maple, cottonwood, and sycamore trees, the raptors keep their eyes trained on the island's banks, waiting for dead and injured fish—usually gizzard shad—to wash up. Eagle and Duck Islands also offer ideal sunning and fishing "seats" for the eagles, as well as trees for occasional night-roosting and protection from the blistering winter winds.

A vastly different kind of bird inhabits Ironsides Island, one of the Thousand Islands of the St. Lawrence River in New York. America's largest wading bird, the magnificent great blue heron has established a rookery of over 100 of its platform nests in the swampy central trough of the 20-acre island. Heavily vegetated with a virgin forest of hardwoods and white pines and an unusual amount of American yew, the island is a glacier-scoured granite knoll with steep cliffs rising 30 to 40 feet above the water. The granite cliffs contain traces of iron ore, thus giving the cliffs an orange color and the island the name of Ironsides. Ironsides was designated a National Natural Landmark in 1967.

Fourteen Potomac River Islands, located only about 22 miles above the nation's capital, were donated to the Conservancy in 1976. Ten were given by Mr. and Mrs. Christian Heurich, Jr., and four by Mrs. Marion Mackall Addison. The islands lie in a section of the river frequented by ospreys, just upstream from the Potomac's scenic Great Falls. Comprising a total of 170 acres, the islands are densely wooded with sycamore, walnut, poplar, and oak trees; the forest on 12-acre Bealls Island may be a virgin stand. The tracts shelter deer, eastern painted and snapping turtles, wild turkey, pileated woodpeckers, great blue and green herons, coots, and a variety of songbirds. Along with local, state, and federal agencies, the Conservancy is endeavoring to preserve more Potomac islands, as well as the shorelines on either side of our "national" river.

Bounded on the west by the Altamaha River and on the east by Lewis Creek and the Buffalo Swamp, Lewis Island, Georgia, is a unique remnant of the huge hardwood forests that once cloaked the southern lowlands. The 6,000-acre island supports oak, tupelo, gum, and bald cypress. The massive cypress trees represent what is believed to be the largest stand of old-growth bald cypress remaining in the Southeast.

Renowned for its wildlife, Lewis Island is also a very rare and lush river swamp. Its myriad, twining



Dome Island, in Lake George, New York, was given to the Conservancy in 1956.

waterways harbor large-mouth bass, alligators, beavers, and river otters. Several uncommon birds inhabit the swamp, such as Mississippi kites, bald eagles, limpkins, wood storks, and one of the world's most beautiful hawks, the swallow-tail kite. Black bears, also now rare in the southern lowlands, have been reported to inhabit Lewis Island. The island swamp was preserved in 1972 when the Conservancy assisted the State of Georgia in purchasing it from the Georgia Pacific Corporation.

Because they are affected over eons of time by the natural processes of river rechannelization and annual spring floods, most river islands and shorelines are gradually changing, constantly being created or destroyed. Consequently, the species of plants and animals—particularly plants—on river islands are characteristic of unstable, low-lying areas. For example, trees like sycamores, silver maples, and river birches can withstand yearly flooding and very damp habitats. Lake islands, on the other hand, are generally more stable since the bodies of water in which they lie also are more stable. Trees growing on lake isles would be species that are more characteristic of upland areas, such as various oaks and pines.

Lake Islands

The glaciated regions of the north-central U.S. and upper New England abound in island-filled lakes. Many of these islands are blanketed with dense northern forests of pine, oak, and fir.

Lying in the center of Lake Wentworth, Stamp Act Island originally belonged to Governor John Wentworth, the last colonial governor of New Hampshire and the person who was responsible for repeal of the Stamp Act. Historians report that during the pre-Revolutionary War era, the island's pines were cut and used for masts on British War vessels. Now uninhabited for many years, the 100-acre island is enveloped by a forest of white and yellow birch, beech, red oak, white pine, red maple, hemlock, tupelo, and black alder.

The 8-acre interior marsh of Stamp Act Island is the site of one of the region's few heron rookeries. The island provides habitat for two nesting birds that are rare in the area—the great blue heron and the loon. Only two loons were hatched in southern New Hampshire in 1975, one on Stamp Act Island. The island also supports American mergansers, mallards, black ducks, migrating Canada geese, least bitterns, and pileated woodpeckers. Acquisition of the isle in 1976 was the culmination of a two-year effort by the Lake Wentworth Association, a Conservancy project committee.

Halfway Pond Island near Plymouth, Massachusetts, is unique for its almost complete lack of human disturbance. Lying in the middle of Great Pond, a 230-acre freshwater lake, the island supports a diverse forest of beech, red maple, eastern hemlock, yellow birch, and white pine. Many of the trees are at least 175 years old. The island's flora is particularly remarkable because it contrasts sharply with the pitch pine and scrub oak forest that dominates the land surrounding the pond and beyond. Because the island is protected by the lake, it apparently has escaped the fires that have been a regular feature of the encircling terrain even before the advent of European settlers.

Furthermore, while the island's forest type is

more common in areas farther north, Halfway Pond Island also contains four species of holly that are usually found to the south, including one holly tree that has been determined as the state's champion female American holly. Birds that nest and breed on Halfway include green heron, ruffed grouse, great crested flycatcher, and eastern kingbird. Now a nature preserve, the unique island has been leased to the Manomet Bird Observatory for use and management as an educational and research area.

John Apperson is well known and remembered (he died in 1963) for his efforts to preserve many of the islands and shorelines of Lake George in the Adirondacks. When he learned that Dome Island might be chopped up into individual campsites, Apperson bought the densely forested little isle. He held onto it many years, paying the taxes, maintaining the island's fragile shoreline, and allowing picnickers, but no campfires. To insure continued preservation of the island, he gave it to the Conservancy in 1956.

An outpost during the French and Indian War, Dome Island Memorial Sanctuary is a gently contoured conical "knob," actually a glacial kame (a ridge or hill of stratified drift deposited by melting water from a glacier). The island is covered with a thick virgin hardwood forest composed chiefly of white and black oak, red and white pine, beech, basswood, hemlock, and paper birch, with a fringe of white cedar trees along the shoreline. Dome Island lies like a sentry at the entrance to a scenic wonderland of over 100 other islands, six mountains, and 18 miles of lakeshore.

Montana's Flathead Lake, the largest freshwater lake in the western U.S., contains the west's biggest freshwater island. Still relatively undeveloped and unchanged, Wildhorse Island varies from sloping, undisturbed shoreline to steep inland ridges and cliffs. It is covered with forests of towering ponderosa pine and Douglas fir, interspersed with lush grasslands of bluegrass, wheatgrass, fescue, and cheat. The island's rugged hills, some rising as high as 1,000 feet, support a herd of about 200 Rocky Mountain bighorn sheep, one of the largest populations in the nation.

A single, lone black stallion also roams the island, the last survivor of a Flathead Indian herd. According to legend, when they were raided by the Blackfoot, the Flatheads swam their horses to safety on Wildhorse Island. Some horses were left and became wild, hence the island's name. Acquired in late 1977, Wildhorse will be transferred to the state for management in cooperation with the University of Montana.

Above Lake Superior lies the Quetico-Superior Wilderness Country, overlapping the Minnesota-Ontario border. It is a land of caribou and wolf, of virgin forests and white-water rivers, of clear, blue lakes that stretch farther than the eye can see. It is also the country and home of Sigurd Olson, naturalist and writer. No one could describe this vast unspoiled region as vividly and lovingly as he has in his many books.

In *Wilderness Days* (1972) he wrote, "My wilderness world has to do with the calling of loons, northern lights, and the great silences of land lying north and northwest of Lake Superior. I have heard the song of this wilderness from the border country of Minnesota and Ontario to the lonely reaches of the tundra close to the Arctic, but I hear it best in the beautiful lake region of the Quetico-Superior . . ."

Sigurd Olson has done much of his writing from the rocks of Listening Point, one of his favorite haunts and the title of one of his books. The Point overlooks Burntside Lake in the Superior National Forest of Minnesota of the Quetico-Superior Wilderness. Across the lake and directly in line-of-sight of Olson's famous Listening Point, lie two islands that the Conservancy purchased in 1974 with funds provided by the Ober Foundation. Snellman and Pine Islands are classic examples of the pine-forested, glaciated, rocky isles of the northern lake country. Both islands lie within the known range of a local wolf pack. Had the islands become dotted with cabins, the wolves would surely have disappeared. "If the great, gray timber wolves ever leave the Quetico-Superior," Olson wrote, "the land will lose its character. It may still be a wilderness, but one with the savor and uniqueness gone."

The islands described in this article are a wide geographical sampling of inland islands saved by the Conservancy. Most are quite different, biologically; but all are microcosms of the natural world—ideal preserves buffered and further protected by their surrounding waters. Many inland islands are still wildernesses, revealing plants and animals that have disappeared on the populated mainlands. And like all types of islands, everywhere, they possess that irresistible island appeal.

Unfortunately, it is also this appeal that is endangering our country's vast and rich island heritage. Islands are fragile resources, vulnerable not only to nature's destructive forces, but to human depredation as well. As the desire for second homes and vacation retreats increases, so too does the desire to plant these structures on a tranquil island. We have robbed our wildlife of infinite stretches of mainland habitat. Can we not, at least, leave our native animals and plants the isolated isles?

The Atlantic Barrier Islands: Their Preservation Benefits All

Writing about the Conservancy's east coast barrier islands inevitably leads to the use of certain cliches, and there's no reason this piece should be any different. Adjectives such as beautiful, pristine, unspoiled, and remote find their way through the typewriter keys regularly and unavoidably, like the black ducks that come like clockwork to winter in these sanctuaries.

That's no apology. Cliches may be the bane of creative writing instructors, but they are nothing more than harmless redundant truths, and they are validly applied to these sandy, fragile strips of islands which, unlike their counterparts, have managed to dodge the insane blight of condominiums and resort developments.

I had the good fortune to grow up on the Virginia coast where some of the finest of these islands are only a short boat ride away. I have no doubt that the islands shaped my life and colored my view of the natural world. They taught me things I would never have learned in a classroom.

When I was barely old enough to walk, my father introduced me to Cedar Island. I can still remember the feel of the sand on my feet, the awesome power of the ocean, and the limitless spaces of beach and sky and water.

When I was older, my father taught me to fish and hunt. We caught flounder and trout in the bays and inlets behind the islands, and in the fall we shot rail and ducks in the saltmarshes. I realize now, and I'm sure my father knew then, that the things he was teaching me were more important than where to find grey trout at low tide or how to lead a passing black duck. In the islands and marshes I learned about life and death, and I learned man's place in the natural world.

Years later, in 1970, I was in Alaska working as an Air Force photographer when my hometown newspaper brought the horror story of a $66 million resort development planned for Smith, Myrtle, and Ship Shoal Islands. In succeeding weeks I read with increasing concern of the airport, marinas, golf course and resort homes, and of the causeway that was supposed to traverse several miles of prime wetlands to tie the three islands to the mainland.

Promised increased tax revenues, jobs, and prosperity for all, local officials warmed to the

By Curtis J. Badger

idea, despite the questionable logic of locating such extensive development on islands that were little more than sandbars.

The Nature Conservancy entered the picture in late 1970, to the anguish of most local officials and real estate entrepreneurs, but to the delight of the rest of us who prefer the islands without condominiums and highways. In November the Conservancy announced the purchase of Godwin Island, which was just northwest of the proposed development. A month later the sale of Smith, Myrtle, and Ship Shoal Islands to the Conservancy made front page news in most eastern Virginia newspapers. Funds to purchase the three islands were provided by the Mary Flagler Cary Charitable Trust. The massive resort development was dead, and the local press was full of quotes from officials accusing the Conservancy of being "island grabbers" and of resorting to trickery in enticing the development corporation to sell. But to conservationists, the Conservancy was the U.S. Cavalry, coming over the hill at the last minute with bugles blowing, to save the settlers from a certain scalping.

In reality there wasn't that much drama involved. The developers, in all probability, were ready to give up on the project, realizing that a development of the scope they intended on the unstable barrier islands was folly. Wetlands legislation brewing in the Virginia General Assembly added the finishing stroke.

Since the initial purchases in 1970, the Conservancy has added thousands more acres of sandy islands and productive wetlands—also with Cary Trust donations—and in 1977 created the Virginia Coast Reserve, with a local office on the mainland in a rambling 18th century mansion which the Conservancy plans to restore. The Virginia Coast Reserve includes about 35,000 acres comprised of 13 islands and the rich tidal marshes that separate the sandy island strips from the mainland. Four other islands in the barrier island chain are maintained as state or federal refuges. Assawoman Island remains privately owned and unprotected, as do parts of Cedar Island, which was subdivided in the 1950s and has several hundred owners besides the Conservancy.

The Virginia Coast Reserve forms the nucleus

of almost 100,000 acres of barrier islands and wetlands on the east coast preserved by the Conservancy. Although the Conservancy manages the 35,000-acre Virginia Coast Reserve, most of its other island holdings have been transferred to state and federal wildlife agencies for use as wildlife sanctuaries. Barrier islands in Virginia, North Carolina, South Carolina, Georgia, and New York have been saved through Conservancy efforts.

In December 1977 Monkey and Swan Islands on the North Carolina Outer Banks were purchased with a $4 million grant from the Richard King Mellon Foundation (believed to be the largest foundation grant ever given to a private conservation organization). The protected area consists of more than 6,500 acres on a thin peninsula about 20 miles south of the Virginia-North Carolina line and includes three and a half miles of ocean front and extensive marshlands bordering Currituck Sound, an important wintering habitat for waterfowl and a valuable spawning ground for commercially important finfish and shellfish. Peregrine falcons, southern bald eagles, and osprey are frequently sighted in the area.

Carrot Island and Bird Shoal, which along with the Maine coastal islands inspired Rachel Carson's best selling *The Edge of the Sea,* were purchased by the Conservancy in 1977 and will be transferred, after fund raising is completed, to Duke University for use by its Marine Laboratory. The 474-acre holding is a prime nesting area for sea and marsh birds. Carrot Island, a natural field laboratory, has been used for research since the 1880's when the John Hopkins Seaside Laboratory established a field site.

In March 1978 the Conservancy assisted the State of North Carolina in purchasing 1,000 acres of a 10,000-acre tract in the Bald Head Island Complex. The 1,000-acre parcel consists of high ground on East Beach, Bluff Island, and Battery Island. Bluff Island is an outstanding example of the hammock habitat found in the complex of islands and marshlands, and Battery Island supports a large bird rookery. Endangered loggerhead turtles use the beaches of these barrier islands as nesting sites, while herons, egrets, and ibises breed in the marshes.

In South Carolina, the Union Camp Corporation donated 1,700-acre Turtle Island to the Conservancy in 1975. The island, located about 19 miles north of Savannah, Georgia, is a nesting site for loggerhead turtles. It consists of about 25 acres of beach and 90 acres of high land. The remainder is saltmarsh. The island was turned over to the state for use as a wildlife management area.

Two of the Conservancy's most notable projects are in Georgia, where Wassaw Island and Ossabaw

Ossabaw Island, Georgia

Islands were purchased and transferred to federal and state governments for use as wildlife sanctuaries.

Wassaw Island was bought in October 1969 with a $1 million gift from Mrs. Margaret Parmly of New York City. The island consists of 10,700 acres, 9,000 of which are productive saltmarsh. The island is now a National Wildlife Refuge.

Two other Georgia coastal islands also were acquired in 1969, shortly before the purchase of Wassaw. Wolf Island, in Altamaha Sound, is a vital sanctuary for migrating waterfowl. Like Wassaw, it is largely marsh but partly forested and exposed sea beach. It comprises 3,478 acres. Lying near Wolf, 600-acre Egg Island is also an important refuge for the waterfowl and seabirds of the East Coast. Both islands were transferred to the Fish and Wildlife Service and are now National Wildlife Refuges.

One of the best known of the east coast barrier islands saved by the Conservancy is Ossabaw,

Snow geese

Sand crab

which was optioned in April 1977, then was purchased and transferred to the State of Georgia last spring. The island's purchase price was $8 million, $4 million of which were donated by Atlanta philanthropist Robert W. Woodruff. Ossabaw was owned by the family of Eleanor Torrey West, who used the island and the large home built by her father as a retreat for artists, writers, and scholars.

The 25,006-acre island is a part of Georgia's Heritage Trust. Ms. West will retain the family home and about 30 acres, where the Ossabaw Island Project Foundation, begun by Ms. West in 1960, will continue.

The Conservancy's first barrier island project was in New York. In 1953 the Conservancy assisted in the purchase of Sunken Forest Preserve, a 73-acre tract on Fire Island. The half-mile long, bay-to-beach segment is now a wildlife sanctuary.

Whenever the Conservancy has acted to save a barrier island system the inevitable cry goes out that the islands are being saved "for the birds" while the interests of people are being ignored. This incongruous attitude, which somehow seeks to pit the welfare of humans against the welfare of other living things, could not be further from the truth. Islands and marshes are some of the most productive natural systems in the world, and their preservation benefits all.

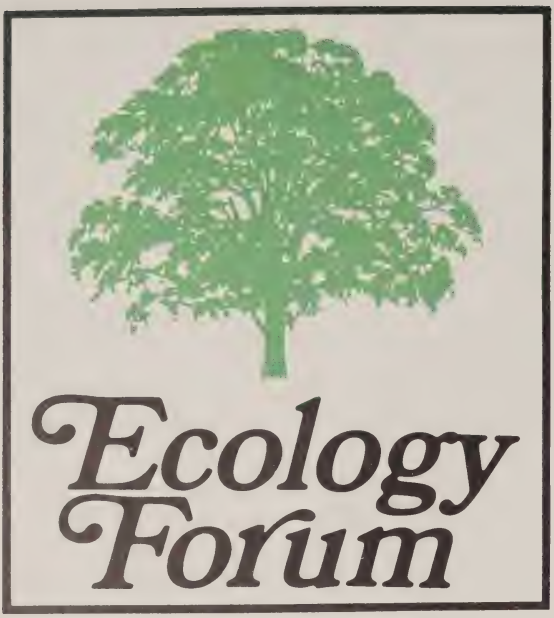
The value of barrier islands and their salt marshes is incalculable. From a geological point of view, the systems act as a natural shock absorber for the mainland, absorbing the tremendous energy of the ocean and acting as a buffer when storms bring high tides and violent wave action. The wetlands play an important role in the life cycles of nearly every commercially valuable fish caught in the United States. Only tuna, haddock, yellow tail flounder, and ocean perch, among the leading commercial species, are not associated with the estuaries.

In Virginia, for example, last year's commercial seafood catch topped $43 million in dockside value. All of the species taken are dependent on the island systems and marshlands at least part of their lives. Add the considerable economic impact of recreational fishing, and the annual amount of money circulated approaches something like $100 million.

For conservationists and non-conservationists alike, this makes a pretty good argument for preservation. Filling marshes and building resort homes might sound like tempting economic ventures to many coastal communities, but when the last bit of spartina grass is covered, and when the last condominium unit is sold, the cash flow will begin to trickle. The barrier island systems offer an investment based on continuity. They feed millions of Americans, they create thousands of jobs, and they do it year after year, generation after generation.

But economics are not the only reason for saving our barrier islands and wetlands. They are unique, special places, and the intangible benefits offered by islands like the Virginia Coast Reserve, Ossabaw, and North Carolina's Outer Banks transcend the profit and loss statement. As with other wild places, these islands have values that cannot be measured in dollars. We need places that are remote, where we can occasionally escape the insanities of our own inventions. These places must be preserved. When they are gone, they will be gone forever.

Curtis Badger is News Editor for *The Eastern Shore News* in Accomac, Virginia.



No. 28

by Ray M. Culter and
Robert E. Jenkins

ISLANDS AS PRESERVES

For purposes of ecological conservation, islands have unique potential as preserves. Of the 690 preserves retained and managed by The Nature Conservancy, 95 are islands, part of islands, or clusters of islands. These 95 areas contain 89,988 acres, about 20 percent of the total acreage under Conservancy management. (Statistics were obtained from the Conservancy's computerized Preserve Data Base.) These island systems pose special opportunities and constraints as ecological preserves and as land management units. To begin with, because islands are what they are—bodies of land surrounded by water—they unequivocally set certain design limits. The viability of a preserve for a particular species or an assemblage of species is usually believed to be most directly related to the size of the habitat. On the mainland, it is often feasible to enlarge a preserve by protecting adjacent habitat. But islands, obviously, cannot be made any larger.

Among the existing Conservancy preserves, there are islands as small as a quarter of an acre. These tiny isles hardly can be expected to support a wolf pack—or, for that matter, any higher vertebrate predator that depends primarily on terrestrial prey. It's not surprising, then, that the food chains on smaller islands become shortened and that, in the absence of predators, a consequent growth of some populations of herbivore species occurs. Over time other population constraints may arise with balancing effects, but the initial colonization of islands by new plant-eating animals may produce, instead, very noticeable and destabilizing results. Even very large islands throughout the world have been turned into deserts by introduced grazing animals that have no natural predators on the islands. The most famous example is the European hare, which was released in Australia in 1859 and within three years was regarded as a national calamity. The widespread destruction of vegetation that occurs from such an introduction also may lead to the decline or extinction of other island plant and animal species—a serious problem for the island preserve manager.

Furthermore, the introduction of a predator species to an island where it did not previously exist may be devastating for other island fauna. On islands isolated and predator-free over a long period of time, the resident species populations may gradually lose their defensive adaptations, making them particularly susceptible to extinction from introduced predators. In his book *The Alien Animals* (Natural History Press, 1966), George Laycock documents several cases of the introduction of a non-native species to control other previously introduced animals. Their release resulted in the extinction of some of the areas' *native* (rather than exotic) fauna. An excellent example is the mongoose, which was released in many of the islands of the West Indies to rid the isles of non-native rats. The take-over of mongooses led to a complete or almost complete extirpation of many species of endemic mammals, birds, and snakes.

But the same sharply defined borders and habitat isolation that make island flora and fauna more fragile also render islands and their inhabitants more manageable. The water barrier that holds the various species captive also bars mainland invaders from the area. Control of species populations, or even the elimination of alien or unwanted elements from the ecosystem, is much more easily achieved on an island than on a mainland preserve. Some of the most widespread introduced pests, like the Norway rat, are extremely difficult to control under any circumstances, but the potential for successful control is certainly maximized on an isolated island.

In addition, islands offer ideal conditions for monitoring the effect of management intervention because the results of surveys and measurements are less likely to be swamped by immigration or the intrusion of other off-site influences. Therefore, islands may be among the best prospects for model or experimental preserves in which one can test biotic management techniques under the most controlled possible circumstances. In this respect, the

Virginia Barrier Islands and Santa Cruz are notable examples.

The same conditions also mean that islands offer extraordinary potential for scientific experimentation, as demonstrated by Dan Simberloff's research on Florida's mangrove islands. From the Conservancy's conservation management perspective, however, such research possibilities merit careful attention, but must be cautiously considered since experimental interventions can easily disrupt a fragile island system. Experimentation in the Conservancy's unique model preserves should probably be limited to careful research on factors influencing preserve management, such as the elimination of intrusive exotics. More theoretical research may be better suited to those islands where no uncommon or endangered species or ecosystems will be affected. Potentially destructive studies may be best suited to archipelago preserves where the biota and associations are common to many islands and where there are many options from which to choose the ones most fitting to the experiment. In such situations, disruptions may be quickly repaired by natural reinvasion (or deliberate reintroduction) and succession.

Islands tend to attract visitors like magnets, and the activities of all people using islands affect and are affected by the same variables discussed above. Use-pressures on Conservancy islands, whether for recreation, education, or scientific research, are expected to intensify. Consequently, the Conservancy will need to adopt increasingly sophisticated approaches in coping with more visitors. On barrier islands, for example, the open beaches can likely withstand a tremendous amount of simple foot traffic without harm. Yet the same traffic on the dunes could destroy the dunes' binding grasses and disrupt the entire system. Furthermore, portions of an island might contain exceptionally fragile elements, such as sea bird rookeries or nesting sites, turtle spawning grounds, and vulnerable plant communities. All of these areas must tbe protected from human use. In order to adequately safeguard an island sanctuary and its critical elements, an ecological inventory of the area and the development of a master plan must be carried out. With this information and documentation in hand, management decisions for an island preserve can be made—such as controlling permissible uses and access, scheduling compatible activities, and restricting human use on fragile tracts.

Proper management of island preserves imposes difficulties and expenses of a different type than those encountered on mainland sanctuaries. Again, the factors of barriers and isolation make the difference, presenting logistical problems in transporting people and equipment for any management operations. Maintaining on-island facilities is especially cumbersome. In an automobile-oriented society geared to ever-increasing vehicular comings and goings, managing an island from the island itself requires a complete change of strategy and attitude. Every single physical and spiritual requirement must be anticipated in detail and well in advance; everything must be transported by boat or plane; all contingencies must be prepared for and an unusually large stock of necessities must be maintained. Practical thinking suggests that, except for the largest and most remote islands, or those with special management demands, it would be best not to contemplate on-island habitation or facilities.

Because of the fragility of islands and increasing pressures on them from human use, the Conservancy should focus especially intensive stewardship research on its island preserves. Developing new techniques for introduced species control, restoring habitat, and addressing other endemic island problems could prove beneficial for beleaguered islands throughout the world, and for mainland preserves as well. The Conservancy's efforts in island management and preservation are still in their infancy, but this means that prospects are especially interesting and exciting.

INDIANA HERITAGE PROGRAM GETS UNDERWAY

Last May, in a cooperative venture with the state's Department of Natural Resources, The Nature Conservancy launched a Heritage program in Indiana. It is the Conservancy's twelfth state Heritage Trust Program. Announcement of the venture was made in Indianapolis by Governor Otis Bowen, who said, "The Indiana Heritage Program will provide valuable information on the status and location of the state's most threatened natural areas."

Initial funding for the program is being made available from a $50,000 appropriation by the Indiana Legislature and a $45,000 grant from the Indiana Electric Association, which is comprised of five investor-owned utilities: Indiana and Michigan Electric Company, Indianapolis Power and Light Company, Northern Indiana Public Service Company, Southern Indiana Gas and Electric Company, and Public Service Indiana.

Like the programs established in other states, the Indiana Heritage Program is a systematic natural diversity inventory and protection planning effort. In addition to its practical applications in Indiana, the program will add to the growing body of information about the nation's natural heritage being yielded by the programs that are now under way in ten other states and one region.

NEW PROJECTS

California

STEWART'S CREEK (Sonoma County). The 80-acre property contains an undisturbed growth of chaparral, chamise, manzanita, bay, madrone, toyon, and Douglas-fir, providing habitat for coyote, deer, fox, weasel, and various bird species including the pileated woodpecker. Mountain terrain and associated canyons result in a non-uniform distribution of vegetation and habitat type. The tract, a gift of Mr. Otto Teller, will be managed by two preserve managers to expand an ongoing environmental education program.

Connecticut

BURNHAM BROOK PRESERVE—Addition—(Town of East Haddam). The 32-acre property is forested with hemlock and hardwoods and crossed by two brooks. It is part of a planned assemblage which, when completed, will protect the entire watershed of Burnham Brook and thus a significant piece of the eastern Connecticut highland ecosystem. Now totaling 173 acres, the preserve is managed by a preserve committee of the Connecticut Chapter.

DEVIL'S DEN PRESERVE—Addition—(Town of Weston). With this addition, Conservancy ownership of the Ambler Brook watercourse is complete. Fourteen of the addition's 53 acres were a gift of Mrs. Anna S. and Miss Elizabeth R. Ambler. The property, providing a vista over the Den southeast to Long Island Sound, will be managed by the Devil's Den Committee.

Florida

JANET BUTTERFIELD BROOKS PRESERVE—Addition—(Hernando County). The 40-acre gift of Janet Butterfield Brooks connects two portions of the 290-acre preserve. The property, covered with high hammock, longleaf pine, turkey oak, and loblolly pine, will be managed by the Florida Chapter.

Georgia

OKEFENOKEE SWAMP (Charlton, Clinch, and Ware Counties). A gift of the Union Camp Corporation, the 16,626-acre property doubles the size of the perimeter swamplands of the existing National Wildlife Refuge. The Okefenokee, "Land of the Trembling Earth," is based on geological formations that were created during the Pleistocene Epoch, when the ocean still covered southeast Georgia. Today, the swamp shelters 225 species of birds, 58 of reptiles, 32 of amphibians, 34 of fishes, and 42 species of mammals, including the endangered Florida panther. The gift,

valued at $6.5 million, includes 25 percent of the swamp perimeter along with a thin adjoining buffer strip. The property has been transferred to the U.S. Fish & Wildlife Service.

Idaho

BIRDS OF PREY (Ada and Elmore Counties). The 259-acre tract is a key inholding within the Snake River Birds of Prey Natural Area, which is managed by the Bureau of Land Management. The rocky ledges and pinnacles of the rugged river canyon provide nesting habitat and the principal prey (Townsend's ground squirrel) for the densest nesting population of birds of prey in the world. Over 263 pairs of 14 species, including the endangered peregrine falcon, golden eagle, prairie falcon, ferruginous hawk, red-tailed hawk, American rough-legged hawk, and American kestrel, are found in the area. A one-year fund-raising campaign with a goal of $500,000 is underway for this and other tracts within the Birds of Prey Project. The property will be held as a Conservancy preserve with a resident manager under the supervision of the Northwest Office.

Indiana

SPICER LAKE (St. Joseph County). The 40-acre swamp forest is listed in *Natural Areas in Indiana and Their Preservation* by A. A. Lindsay, et. al. A textbook example of current lake succession, the property includes 3.5 acres of open water and red maple swamp forest. Sassafras, spice bush, gray and red osier dogwoods, swamp rose, and nanny berry are also abundant. A joint fund-raising project of the Indiana Chapter and the South Bend Audubon Society, the project will be dedicated as an Indiana State Nature Preserve and transferred to the St. Joseph County Park and Recreation Department for management.

Michigan

FREESOIL (Mason County). Surrounded on three sides by Manistee National Forest, the 10-acre tract was purchased on behalf of the U.S. Forest Service. The wooded property, dominated by oak and jack pine, will become part of Manistee National Forest.

HIAWATHA MANAGEMENT AREA (Mackinac County). An inholding within the Hiawatha Special Waterfowl Management Area, the property provides refuge for great blue herons, broad-winged hawks, Canada geese, mallards, American bitterns, and ruffed grouse. The 80-acre tract will be transferred to and managed by the U.S. Forest Service as part of Hiawatha National Forest.

ST. MARTIN BAY (Mackinac County). Containing 3,000 feet of frontage on St. Martin Bay in Lake Huron, the area is in the center of the Horseshoe Bay Special Management Area, which is managed as an eagle habitat. The forested tract provides refuge for abundant birdlife, including great blue heron, broad-winged hawk, American bittern, least bittern, and a varety of songbirds. The property will be transferred to the U.S. Forest Service and managed as part of Hiawatha National Forest.

Mississippi

CLARK CREEK (Wilkinson County). A gift of the International Paper Company, the 427-acre property consists primarily of beech-magnolia and bottomland hardwood forest. The area is listed by the Mississippi Natural Heritage Program because of the presence of a rare plant (the Alleghany spurge), a peripheral land snail, and an abundance of waterfalls, ranging in height from 20 to 50 feet. A popular site for college biology field trips, the property will be managed by the Game and Fish Commission and made available to the people of Mississippi as a natural area.

PANTHER SWAMP (Yazoo County). Given a #7 priority in the U.S. Fish & Wildlife Service's Acquisition Program, the 12,022-acre area consists of semi-permanently flooded sections, low overflow bottomlands, and high floodplain lands. It is estimated that approximately 250,000 birds winter in the Yazoo Basin, which provides valuable roosting and nesting places. Waterfowl, such as mallards, wood ducks, several species of herons, egrets, and ibis fly out from their swamp base to feed in agricultural fields. The American alligator, bald eagle, and peregrine falcon are found in the swamp, and the area provides unbroken habitat required by the Florida panther. The property has been transferred to the U.S. Fish & Wildlife Service for management as a waterfowl refuge.

Missouri

STUTESMAN PRAIRIE (Cedar County). The proximity of this 90-acre prairie to the Conservancy-owned Monegaw Prairie contributes to the preservation of a viable northern greater prairie chicken population. In extremely dry weather the land is very valuable as the permanent water supply for prairie chickens. The topography is a combination of rolling hills, shallow soils, and dry sites to less rolling areas, deeper soils, and moist sites—conditions that support a diverse plant community. Management of the area will be the responsibility of the Missouri Department of Conservation.

Montana

BLACKFOOT RIVER (Powell County). A conservation easement on a 500-acre tract is a gift of Mrs. Patricia Lobdell. For the most part the land occupies a lowland terrace of the Blackfoot River, but also contains some rocky precipices that support a population of nesting raptors. Forests of ponderosa pine, lodgepole pine, and Douglas-fir predominate. The marshy lowlands at the confluence of Chamberlain Creek and the Blackfoot provide excellent habitat for beavers. Mergansers, great blue herons, sandpipers, golden eagles, osprey, and grouse are among the resident and migrating bird species found along the Blackfoot. Mule deer and elk find refuge in the upper country along with black and grizzly bears, lynx, mountain lions, wolverines, and coyotes. The Blackfoot River fishery is one of the finest in the state. The Northwest Office is fund raising $10,000 to meet costs of the easement program, but the land will be managed by the owners.

LION HEAD RANCH (Sweetgrass and Park Counties). The upland portion of the 3,050-acre tract is critical elk wintering range. Boulder River meanders through adjacent portions of the ranch forming a steep valley through the rugged terrain. Vegetation includes native grasses, shrubs, aspen, cottonwood, and pine. The area will be transferred to the Montana Department of Fish and Game or another conservation buyer.

New York

ATLANTIC DOUBLE DUNES—Addition—(Suffolk County). Given the highest priority rating for National Natural Landmark designation in the National Park Service Atlantic Coastal Plain Theme Study, the 15-acre addition is part of a critical three-mile strip of barrier and secondary dunes. The property with its temporary pools includes such vegetation as American dune grass, beach plum, bayberry, and cranberry. The dune complex is also considered a potential wintering area for the Ipswich sparrow. Fund raising and management of the preserve are the responsibility of the South Fork-Shelter Island Chapter.

THOUSAND ACRE SWAMP — Addition — (Monroe County). The acquisition of 10 acres brings the preserve to 86 acres. One of the few large undisturbed areas remaining in western New York, the swamp contains habitats varying from cattail marsh and swamp to dry, stony upland forest. 280 species of plants belonging to 70 different families are found here, some of which are at the northernmost limit of their ranges. A resting place for migratory waterfowl, the area also harbors the locally rare Massasauga rattlesnake. The preserve is managed by the Western New York Chapter's Thousand Acre Swamp Committee, which is also fund raising to acquire additional tracts within the swamp.

North Carolina

SADDLE MOUNTAIN (Surry County). A 960-acre forest of second growth oak, chestnut oak, and poplars, the rugged property is a gift of J. Gordon Hanes. The property will be leased to the Eckerd Foundation as a wilderness camp for an interim period pending an inventory of the property to determine future uses.

Ohio

FRAME BOG—Addition—(Portage County). The 10-acre tract will serve as a buffer for the 72-acre Frame Bog Preserve, a National Natural Landmark. The bog, one of the few remaining sphagnum tamarack bogs in the state, contains relict northern flora, some of which are rare in Ohio. White camass, shrubby cinquefoil, round-leaved sundew, grass-of-parnassus, cranberry, and bayberry grow in the bog, which fringes a 17-acre lake. Funds for the purchase were provided by the Ohio Chapter and the Kent State University Foundation. The property will be transferred to the State of Ohio and dedicated as a State Nature Preserve.

Oregon

ROWENA DELL PLATEAU (Wasco County). One of the richest wildflower displays in Oregon, the 34 acres lie in the transition zone between the dry east of the Cascades and the forested western side. A Pleistocene Missoula Flood carved these terraces hundreds of feet above the Columbia River. Endangered plant species found in the area include ballhead waterleaf and Columbia lovage, along with several endemic and rare Columbia Gorge species, as well as grass widows, yellow bells, and balsam root. Vernal pond communities and one permanent pond harbor ducks and their young. The area will be managed by the Northwest Office.

South Carolina

WHOOPING CRANE POND (Beaufort County). A conservation easement on 137 acres of land in Hilton Head Plantation including the 90-acre Whooping Crane Pond was donated by joint owners Hilton Head Plantation Company and the Port Royal Plantation Group. The property, identified by the South Carolina Heritage Trust Program as one of the most important egret rookeries in the

state, is home to approximately 100 pairs of white ibis. Comprised of pine uplands, black gum swamp, open marsh, and pond, the area abounds in wood ducks, cattle egrets, anhingas, and American alligators. Louisiana and green herons have also been sighted there. The area is used for passive recreation and will continue to be maintained as a nature sanctuary.

South Dakota

AURORA PRAIRIE (Brookings County). A lush big bluestem prairie, the 30 acres have a high water table that produces late blooming grasses and an abundance of forbs. The 250 species of native plants on the wet meadow prairie include phlox, liatris, bottled gentian, and lilium. Short-billed marsh wrens inhabit the area along with beavers, which have dammed a creek, creating a small pond on the preserve's eastern edge. Fund raising for the purchase is being carried out by the Midwest Office and the South Dakota Chapter. Management will be the responsibility of the Botany-Biology Department of South Dakota State University.

Texas

ENCHANTED ROCK (Llano and Gillespie Counties). Named for a unique oval-shaped granite mountain covering more than a square mile and rising 1,825 feet above sea level, the 1,640-acre area features a variety of habitats that harbor 15 rare and/or endemic species, including the plants quillwort, pillwort, and adder's tongue. A designated National Natural Landmark and Texas State Landmark, the property is also rich in archeological history with evidence of Indian civilization more than 12,000 years before white man came to this country. The land has been transferred to the Texas Parks and Wildlife Department for management as a recreational, scenic, and natural resource.

Vermont

READSBORO (Benington County). Contiguous on several sides to parts of the Green Mountain National Forest, the 3,956-acre property is a gift of Mr. Henry F. Harris. The area consists of moderately steep to very steep slopes covered with northern hardwood forest interspersed with spruce and balsam. Brooks drain in all directions with Lamb Brook as the main stream. The property will be sold to the U.S. Forest Service for addition to Green Mountain National Forest, and the proceeds will be used to fund other projects in Vermont.

Virginia

VIRGINIA COAST RESERVE — Addition — (Northhampton County). The Brownsville addition, an area of approximately 1,400 acres, provides deep water access to Hog Island Bay and suitable grounds for construction of a mainland office, caretakers' residence, and research facility for the 35,000-acre Reserve. Consisting mostly of low salt marsh almost exclusively vegetated by *Spartina alterniflora,* the property provides habitat for clapper rail, black duck, Canada and snow geese, mallard, brant, pintail, American widgeon, shoveler, and canvasback and redhead ducks. The endangered peregrine falcon and osprey hunt the area. The tract contains the Brownsville house, built in 1806. The house is on the federal and state registers of historic landmarks. Funds for the purchase and development are being sought through a $1.4 million fund-raising effort directed by the National Office.

West Virginia

SANDSTONE FALLS (Summers County). Bordering on the New River, which has been designated a protected river by West Virginia legislation, the 1,233-acre gift from Union Carbide Corporation is adjacent to Sandstone Falls, an area purchased and designated by the state as a site for a future park. The wooded land contains two scenic overlooks to the state's property. The West Virginia Heritage Program has found four plants of special interest, including smooth cliffbrake growing on the river's banks. Management of the area will be the responsibility of the West Virginia Chapter until transfer to the State of West Virginia or the National Park Service.

Nova Scotia, Canada

CAPE BRETON ISLAND—Addition—(Victoria County). Continuing the assemblage begun in 1976, the gift of 650 acres from Diana and Angela Russell is located on the northeasterly coast of Cape Breton Island. A nesting ground for the American bald eagle, the land is also home for ruffed grouse, mink, sea otter, muskrats, and snowshoe hares. The area, described as "beautifully wild and unspoiled," features various species of wild orchids and songbirds, including the ruby and golden-crowned kinglet, rose-breasted grosbeak, purple finch, ruby-throated hummingbird, and brown-capped chickadee. The property will be transferred either to the Nova Scotia Department of Lands and Forests or to The Nature Conservancy of Canada.

STRONG PROTECTION SYSTEM CREATED IN MISSISSIPPI

A groundbreaking new law has been passed in Mississippi, with the instrumental assistance of The Nature Conservancy, that forges a strong link between the Mississippi Natural Heritage Program data and an effective system for protecting natural areas. The law (SB 2261) creates a statewide program for the establishment of nature preserves as well as a registry of Mississippi's natural areas.

Areas either dedicated as nature preserves or registered as natural areas must first have been nominated by the Mississippi Natural Heritage program staff after an analysis of the Heritage data and approved by the Mississippi Wildlife Heritage Committee.

Here's how the system works: at least twice a year the Heritage staff will analyze the Heritage data to produce a list of twenty-five or so sites considered most important to protect. These sites will contain healthy examples of the rarest and most vulnerable plants, animals or plant communities in Mississippi. After ratification by the Committee, protectors such as Rick Fortenberry, the Conservancy's Mississippi state director, and Bill Quisenberry, Director of the Mississippi Wildlife Heritage Program, will meet to determine the best method of protection for those sites.

Creation of the nature preserves system and the registry enables protectors to select from among a flexible array of non-acquisition tools, varying in terms of strength, duration and cost of protection. Creation of the new protection tools will greatly simplify Rick Fortenberry's job in Mississippi. "There is obviously not enough time or money to acquire everything that needs to be protected," Rick said. "The landscape just changes too quickly." Both Rick and members of the national staff played important roles in the evolution of the Act.

Dedication works much as an easement; the owner conveys potentially destructive rights to the state while continuing to own title to the land, and agrees to protect the rare natural elements that occur there. Property taxes are assessed at a reduced rate according to the value of the property after rights have been dedicated.

Owners of sites which appear on the Mississippi registry of natural areas are informed that their land contains a rare natural element of at least statewide significance. They are asked to agree in writing to protect the element occurrences as long as they own the property and to give the state first option to purchase the property should they receive an offer for the land.

Already, four Heritage sites have been approved for the registry and two are expected to be dedicated soon. When dedicated, one of the two sites will be the first dedicated site owned by a private resident landowner. Several other states having laws which allow dedication have chosen to dedicate only public lands. It is hoped that the Mississippi precedent will inspire broader application of the concept.

CONSERVANCY WINS SERVICE AWARD

In ceremonies on May 17, 1978, at the U.S. Department of the Interior, The Nature Conservancy was presented the Conservation Service Award, the Interior Department's highest award, given annually for "outstanding and direct service to the Department in the field of conservation."

Secretary of the Interior Cecil D. Andrus presented the award to L. Gregory Low, Executive Vice President of the Conservancy. Secretary Andrus said, "This award is given through the newly created Heritage Conservation and Recreation Service in recognition of the Conservancy's devotion to the protection of natural areas and the diversity of life they support. The Nature Conservancy is to be commended for its outstanding contributions of time, energy, devotion, and donations to the states, the federal government, and the American people."

FIRST LAND GUARDIAN AWARD PRESENTED TO MISS KATHARINE ORDWAY

By unanimous resolution, the Board of Governors of The Nature Conservancy named Miss Katharine Ordway as the first Land Guardian in the Conservancy's 27-year history. In its action to honor Miss Ordway, the Board specified that there can be only one Land Guardian of the Conservancy at any time. The title is bestowed for life.

The unique Land Guardian status was conferred upon Miss Ordway in recognition of her commitment to the Conservancy's objectives and, in particular, for her concern with the creation of the Conservancy's extensive system of prairie preserves. The grassland sanctuaries, which now comprise and protect some 31,000 acres in five states, were preserved largely through Miss Ordway's involvement and personal dedication.

PHOTO CREDITS: Curtis Badger, pp. 20-21, 23, 26; Dave Bohn, p. 11; Susan Bournique, pp. 16 top, 22; Donald M. Bradburn, p. 4; B. A. King, p. 15; John Netherton, p. 16 lower right; W. S. Peckover, New Guinea Bird Society/Courtesy of World Wildlife Fund, p. 7 right; Y. J. Rey-Millet/Courtesy of World Wildlife Fund, pp. 6, 7 left; Richard H. Smith, Earth Imagery, p. 16 lower left, inside front cover.

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